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ANITA VIRÁNYI

SPECIAL EDUCATION TEACHERS' KNOWLEDGE AND BELIEFS OF THE RELATIONSHIP BETWEEN ICT AND SPECIAL EDUCATION

SUPERVISOR: DR. MESTERHÁZI ZSUZSA PROFESSOR EMERITA

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Introduction to the problem

Information and communication technology (ICT) tools are gaining increasing importance in both everyday and professional life. Today students often use digital devices and other information and communication technology in their learning activities at school and at home, and they can learn to use them even before they reach school age. *A significant number of children with disabilities are no different in this respect from their mainstream peers.*

In the case of *persons with intellectual disabilities* using ICT tools is necessary for learning, employment, social inclusion and in everyday life. This may be especially true for persons with mild intellectual disabilities, a significant proportion of whom will be able to lead partially or fully independent adult lives (Mesterházi, 1998). It is believed that special needs education must prepare children and young people for using ICT tools, and make this a natural part of learning activities.

In accordance with the principles of equal opportunities and the right to education for all this should be extended to teaching students with special needs, including those with intellectual disabilities, learning difficulties, and among them, students with mild mental retardation. In order for schools educating children with mild intellectual disabilities to meet the challenges of the information society, the right tools, ICT facilities and special needs teachers are required. However, research (e.g. Buda 2007, Kárpáti – Ollé 2007, Smeets 2005, Gialamas and Nicolopoulou 2010) shows that a well-established ICT background does not necessarily mean there is a team of clearly involved (special needs) teachers in an institution.

We may say that if school education does not place sufficient emphasis on this question, young people leaving school will have disadvantages in this area later in life, in their life-management, their employment, etc. Naturally, due to the different abilities and stages of development of SEN students, a specific approach is required, as well as and methodological procedures that differ from those used for mainstream students in that they are based on the expertise and practices of special needs education.

The preparedness, knowledge and competences of special needs teachers and teachers who are engaged in educating students with mild intellectual disabilities are decisively important in this process.

However, it is important to note the opinions, attitudes and beliefs of the above mentioned professionals towards the digital tools and ICT beside their more objectively assessable knowledge. These can influence on the one hand their own skills development, and on the other the approach of students with mild intellectual disabilities to the instruments referred to.

Throughout its history, special needs education as a science has interpreted the concept of disability and attitudes towards disability in a variety of ways and along different models. Those ways or models of thinking that apply most to the professional viewpoint of special needs teachers may influence their relationship with SEN students, their own activities and preferences, as well as the way they shape and organize the learning process and select the equipment to be used, besides defining the ultimate aim of education, teaching and training. The question arises as to how professional thinking along certain lines and models has had an effect on the relationship between the person with disabilities and the ICT tool, and the role played by the ICT tools in the life of persons with disabilities.

In short, in our opinion ICT tools are just as present in the lives of the people with disabilities as in the lives of non-disabled persons, so it is necessary for special needs teachers to embed these tools in the teaching process in SEN training, as in mainstream education. In any event the special needs teachers' ICT skills, their knowledge, beliefs and their attitudes may play a significant, determinant role. Special needs education is of no less or inferior quality than mainstream education, it seeks to facilitate the students' social participation just as much, so the issue of ICT cannot be ignored. We consider it essential to understand the relationship between the special characteristics of the attitudes held in special needs education along certain models and the attitudes towards the role and use of ICT in SEN training.

Theoretical Frameworks

The theoretical foundations of our research are based on our initial focus of the two main models of disability, with regard to their historical context. (Ainscow–Muncey 1988, Csányi 2000, Kálmán–Könczei 2002, Kullmann–Kun 2004, Gordosné 2004, Baglieri-Valle-Connor-Gallagher 2011). Today in the international professional literature – with the interpretation of the groupings of the different approaches (e.g. Bleidick (1976, Maschke Sr. 2010), Pfeiffer (2001, Maschke Sr. 2010) Bickenbach (1993, Maschke Sr. 2010), Kálmán-Könczei (2002), Csányi (2000), Gordosné (2004), Gaál (2000) – a distinction is made between the two paradigms, namely the **medical (deficit-driven) model of disability** and the **social model of disability**, which are the two most common models describing attitudes towards disability (e.g. Baglieri–Valle-Connor-Gallagher 2011, Tregaskis 2004, WHO 2011).

1. Table. Models of disability

Medical model	Social (pedagogical) model
the error is in the child	there are adverse factors in the environment
the diagnosis primarily identifies and clarifies the deficits	evaluation has a primary role: identifying strengths, needs
labelling	education appropriate for the level of individual development
focuses on the deficit	focuses on individual needs to ensure adequate human and material conditions
segregated institutional framework	integrative or inclusive institutional framework
care of the person is the exclusive domain of specially trained special education teachers	the mainstream teacher is in focus, who works with specially trained SEN teachers
the educational process is based on a special curriculum	the educational process is based on the mainstream curriculum or its adapted version, involving the development of an IEP
characterised by social segregation	characterised by social inclusion

(Csányi, 2000, p. 382)

The **medical (deficit-driven) model** focuses on the cause of disability in a person, as a characteristic of that person, which is thus defined as a symptom of a deficit. Beside any medical analogy, SEN intervention basically involves the identification and naming of the diagnosis and symptom or symptoms. After being ”labelled”, a person (in this case a child) is listed in a disability group and is ”treated” to reduce, correct or compensate the impairment in a separate institution (nursery school, school). The deficit reduction process is implemented by a special needs teacher trained specifically for this, in a specialised institution catering for the disability group based on a specialised curriculum, methodology and set of equipment.

The **social model**, by contrast, does not look at the person as the source of the deficit but looks for the cause of the problem in the environment taking into account the interaction between the person and the environment, the circumstances and the conditions. Instead of focussing on shortcomings, it aims to take account of the person’s needs, and emphasises the strengths, rather than the weaknesses. With regard to educational processes rather than the homogenised methods developed for specific groups, it favours an individual, personalised, methodological approach, which is based on insuring the optimal environmental (human and physical) factors and conditions. A child or a person is not separated here, but attends mainstream institutions in order to promote social participation and facilitate communication. It advocates cooperation between professionals, and considers the issue of social responsibility extremely important.

As for the appearance of a dichotomy in this area of science and what happened with regard to switching between paradigms, three explanations can be found in international sources:

1. Switching occurred in practice as well (e.g. Tregaskis 2004),
2. In practice the trend has little or no validity (e.g. EC 2002, Albrecht–Seelman–Bury 2001),
3. The existence of the two models is not meant to be exclusive (e.g. WHO 2011, Maschke 2010).

The other focus of our research, namely the theoretical background behind the use of ICT in special needs intervention, is difficult to determine, especially regarding students with mild intellectual disabilities.
The concepts and approaches of mainstream education towards information society may serve as a starting point for us (e.g. Adam and Tatnall 2008, Komenczi 2009, Webb 2011), but research into special needs education does not deal in this sense with shaping these models.
There are three main categories of international research into this issue:

- The general use of ICT in the education of children with special needs (e.g. Brodin and Lindstrand 2003, Florian and Hegarthy 2004, Canas 2006, Maguire at. al 2006, NCD 2011, Lindström-Granlund- Hemmingsson 2012)
- The use of ICT specifically in teaching children with intellectual disabilities, learning difficulties or learning disorders (e.g. Renbald 2003, Wehmeier, Smith, Palmer and Davis 2004, Roche 2007, Adam- Tatnall 2008, Bunning, Heath and Minnion 2010).
- The use of ICT in special needs education being influenced by the opinions of special needs teachers (e.g. Cox, M-Preston, C.-Cox, K. 1999, Gialamas-Nikolopoulou 2010).

In Hungary ICT tools and scientific sources dealing with the relationship between ICT tools and special needs education are very limited and there is little research examining this area:

- special needs teachers are missing from the teachers' examination samples or do not appear in them as subsamples (e.g. Török 2007, Hunya 2007, Lakatosné 2010, Fehér 2008, Buda 2007a, Kárpáti-Ollé 2007, Szekszárdi 2006, Nagy–Varga 2006, Golnhofer–Nahalka 2001)
- only a small number of elements can be found in any research to date (e.g. Szili 2011)
- generally, case studies appear in domestic journals (e.g. Gyógypedagógiai Szemle, Új Pedagógiai Szemle)

Our research therefore sought to examine whether the medical or the social paradigm best defines the professional activities of the SEN teacher dealing with students with mild intellectual disabilities, as well as his or her conception of disability. On the other hand we tried to explore the characteristics of special needs teachers using ICT tools, their attitude regarding these tools and the methodological characteristics of their pedagogical/special educational activities. Our activity has been enhanced by exploring the relationship between the teachers' concept of disability and ICT tools.

Research questions

1. SEN teachers teaching children with mild intellectual disabilities and what they think about disability

1.1. Are the attitudes of SEN teachers teaching children with mild intellectual disabilities represented by the deficit-driven model or the social model?
1.2. Are the attitudes of the SEN teachers referred to above characterised more by the features of the deficit-driven model or by those of the social model?
1.3. Does the dichotomy of the models of disability appear in the study? If so, to which standpoint can it be connected?
a) Switching between the models already appeared in practice.
b) Switching between the models has not yet appeared in practice, only in theory.
c) The models are both present, complementing each other.

2. SEN teachers teaching children with mild intellectual disabilities and ICT

2.1. What characterises the home and work–related ICT use of special needs teachers of children with mild intellectual disabilities?
2.2. What characterises the general views, attitude, activity and the perception of their competence concerning ICT in the case of SEN teachers of children with mild intellectual disabilities?

2.3. In the analysed sample what peculiarities characterise the teachers' approach to the use of ICT in their special education practice?
2.4. What do the studied SEN teachers think about the role of ICT in special needs education? In what function do they see it as being more applicable in the case of mild intellectual disability?
2.5. What methodological culture characterises the educational practice and SEN intervention of the studied SEN teachers of children with mild intellectual disabilities, how do a student-centred approach, individualised education, and differentiation appear, and what characteristics does this innovative pedagogical approach and the openness to novelty show?

3. Correlation Dimension

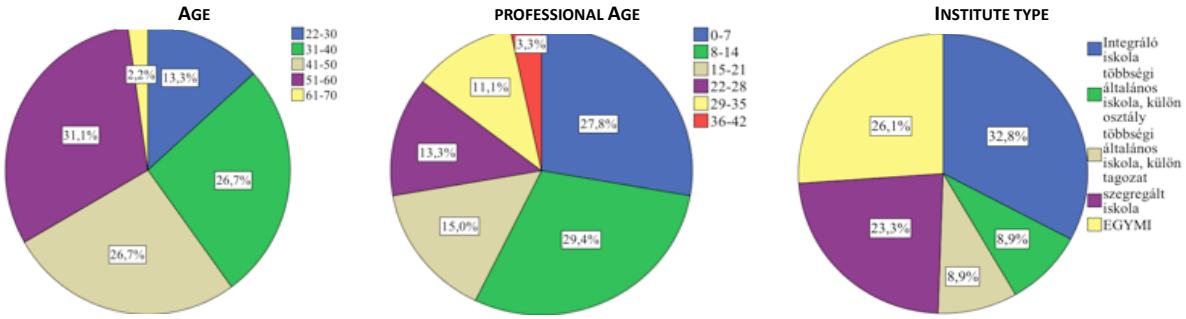
3.1. Is there any relationship between the appearance of a model (the deficit-driven or social model) in the activity of the studied SEN teachers of children with mild intellectual disabilities and factors regarding the use of ICT, and if so, what are they?
3.2. Are teachers possessing a more complex methodological repertoire typically more open to special needs education in the use of ICT?
3.3. Is there any relationship between the types of setting (a segregated form of special needs education or an integrative/inclusive institutional form) of the studied special needs teachers of children with mild intellectual disabilities according to the ICT indicators of these special needs teachers?
3.4. Can these special needs teachers be typified on the basis of their approach to disability and ICT? If so, what characteristics can describe the types? What dimensions and parameters indicate a significant difference between these types?

The methods and tools

The sample

The target group of our research comprised SEN teachers teaching children with mild intellectual disabilities because these children with disabilities account for a significant proportion of students in primary education, while there is also very little international and domestic literature examining the theoretical background of this population or the professionals working with them. What is more, a significant proportion of children classified as having mild intellectual disabilities attend integrative/inclusive education, and the SEN teachers' concepts of disabilities and attitudes towards ICT regarding special needs support can be decisive even for the success of integration/inclusion and in particular with regard to the process of cooperation with other teachers.
Data collection took place between 30th May and 30th June 2012 by contacting SEN teachers of students with mild intellectual disabilities via the Central Information System database (KIR). The final sample comprised 180 people. Their main characteristics are shown in the following diagrams.

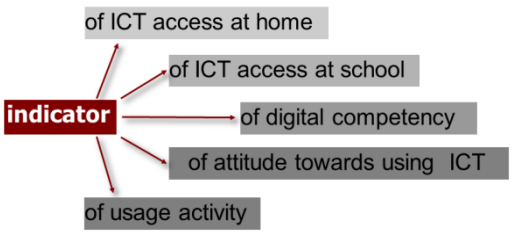
1. Figure. Main characteristics of the sample



Test Instruments

The research study was based on questionnaires designed according to three different approaches, containing open and closed-ended questions and scales.

2. Figure. Indicators of ICT-metria



1. **ICT-metria** (Török 2007): this is a tool designed for educators, which gives information on the communication tools of the studied group along indicators in five fields. The diagram shows the five fields that provide data to be interpreted according to the POIS-model (Educators Educational ICT usage Status model).

2. **Attitude scales**: we have developed our own scales using statistical methods (a reliability test and factor analysis) in order to explore the following:
    a) Attitudes in special needs education: on the basis of the literature within the dichotomy of the two theoretical models (deficit-oriented or social) with sub-scales defined in the following five dimensions: 1. Educational integration 2. Social integration 3. Cooperation 4. Social responsibility 5. Teaching methods;
    b) Attitude testing in relation to ICT: with a scale specially developed for investigating general attitudes towards ICT;
    c) Examination of attitudes towards using ICT in special needs education: examination of attitudes towards using ICT in special needs activities with a specified scale.
3. **Methodological questionnaire:** exploring the characteristics of teaching practice and the use of ICT in teaching: a list of diversified questions based on earlier research conducted with mainstream teachers (e.g. Golhofer-Nahalka 2001, Hunya 2007, Lakatosné 2010) as well as questions specific to special needs education. In addition to the descriptive analysis, indicators and scales were designed in the following three dimensions to interpret the data:
    a) Examination of the methodological characteristics: 1. The education management indicator 2. The teaching methodology scale 3. The individualisation scale 4. Student-centeredness scale 5. The differentiation indicator
    b) Familiarisation with the ICT tools used in practice: 1.The school ICT services scale 2. The ICT skills scale 3. Demand for ICT training
    c) Familiarisation with pedagogical innovation: the innovation indicator

Through our choice of mathematical-statistical analysis, namely correlation analysis and analysis of variance (ANOVA), as well as cluster analysis (the K-Means cluster), our goal was also to become acquainted with the pattern in two main research areas (the conceptualisation of disability and the features of the use of ICT tools in special needs educational practice) beside the global image obtained by the descriptive statistical analyses. On the basis of the cluster analysis we could define a cluster of six-six in both fields, while the patterns of the differences between them illustrate in detail the trends behind the descriptive results.

Summary of the results

1. *Teachers of children with mild intellectual disabilities and their way of thinking*

General approach:

In the sample disability tends to be conceptualised according to the social model.

One exception is the educational dimension of integration, regarding which reflection is not confined to one single model (which perhaps also sheds some light on the uncertainty of the social and educational situation of integrated education in Hungary).

Age and years of professional experience do not typically show any correlation with the way of thinking with respect to the models.

A more detailed analysis:

According to the pattern (shown in 2. table) it can be said that *not all of the distinct types can be characterised by the attributes of merely one or the other model.* Types may be characterised by an attitude marked by both the deficit-oriented and the social model (cluster 1), some ambiguity between the two models (cluster 5), an uncertain attitude that leans more towards the social model of disability (cluster 3), an attitude set only in the dimension of educational integration but which is not based on the social model, being uncertain in that regard (cluster type 2), an attitude following mostly the social model (cluster 6) or one fully depicting the specific qualities of the social model of disability (cluster 4).

2. Table. Connecting to the models of thinking of disability by the clusters

Dimensions of thinking of disability		Clusters					
		1	2	3	4	5	6
Cooperation	model	more social	social	more social	social	ambiguous	more social
Educational integration	model	medical	ambiguous	ambiguous	social	ambiguous	more social
Social integration	model	social	social	more social	social	ambiguous	social
Social responsibility	model	social	social	social	social	ambiguous	social
Educational methods	model	ambiguous	social	more social	social	ambiguous	more social

None of the types indicated a leaning towards the deficit-oriented model to any great extent. Whether any switching between the two models has already taken place in practice as well, or if the models are still present as to complement each other is not possible to determine, on the basis of the results of our research.

2. *SEN teachers of children with mild intellectual disabilities and ICT*

The *Home access to ICT* indicator of ICT-metria shows that our sample has a *high level of access to ICT at home.* This fact is important as it is the home access to ICT that can serve as the basis for using these instruments, regardless of its use in schools (see e.g., Buda, 2007a).

School access to ICT on the basis of the relevant ICT-metria indicator *is considered medium-level by the studied group of SEN teachers*. In the case of nearly three-quarters of the sample schools are equipped with the same or more outdated equipment as found in the home. About the same proportion thinks that the ICT facilities or settings in the institution are of medium quality or better, and similar proportion think that the conditions of ICT use are mediocre or better.

The related indicator of ICT-metria shows a *middle-level ICT-user attitude*.

In the field of ICT competence the respondents show high competences, with 86.7% reporting a high estimation of their ICT abilities and only 1.7% reporting a low estimation.

However, despite the good boundary conditions the active use of ICT is significantly lower in the sample, as the *ICT use activity* indicator yielded a result in the range of *medium level activity.*

Attitudes towards ICT tools in general, and specifically with regard to the assets referred to in *their application in SEN activities*, are rather more positive (scale means: 3.9 and 4.1).

Laymen (and sometimes professionals) constantly raise the issue of age assignment. In this respect it was found that neither in general nor in respect to the application in special needs education *attitudes towards ICT correlates neither with age nor years of professional experience.*

More than half the sample (60%) of all the forms of disability considers the use of ICT relevant, but nevertheless values its roles differently according to the different forms of disability.

In the case of mild intellectual disabilities the proportion of those who do not consider the use of ICT relevant in any of the roles is negligible. In the case of this disability ICT is mostly considered an everyday tool in a disabled person's life, but at the same time, more than half the respondents consider it relevant as a therapeutic instrument and nearly half of them think it can (also) be used as a form of supporting measure

Differentiation in the case of the studied SEN teachers does not show any correlation with the applied educational methods, student-centeredness, and the individualised nature of the process of special needs education.
Although the use of ICT devices can be used as a reward for the students, the SEN teachers of the sample do not favour the use of ICT *based on students' independent interests, decision-making and activities.*
Regarding the application of ICT tools active and wide-ranging web 2.0 activity does not feature greatly in our sample, but the demand for developing skills and knowledge shows their level of commitment in this area and the use of ICT tools in general.
The relationship between the indicators and scales describing special needs practice shows that it is varied education management that correlates most with the diversity of other dimensions, the closest correlation (r=0.649 in the case p=0.00) being between the dimensions of Teaching methodologies and Student-centeredness. The existence of a rich methodological repertoire clearly supports the variety of ways of teaching in a student-centred way, just as accommodating the needs of students in special needs education calls for a greater methodological diversity.
While ICT skills and openness to innovation, as well as a correlation between ICT skills and differentiation (medium-strength, significant), are evident in our sample, there is no correlation between differentiation and innovation or between differentiation and openness to pedagogical opportunities and new ideas and practices. This is partly consistent with the findings of the literature (e.g. Buda 2007a, Kárpáti and Ollé 2007, UNESCO IITE-EADSNE 2011, Smeets 2005, Gialamas and Nikolopoulou 2010, Sanchez and Alemán 2011), according to which training courses relating to the application of ICT are required for the integration of ICT into the teaching process.
It can be said by the pattern (shown in 3. table) that none of our clusters can describe by classification of the same range. They provide quite variable types although the seven clusters were well-separated in the custeranalysis.

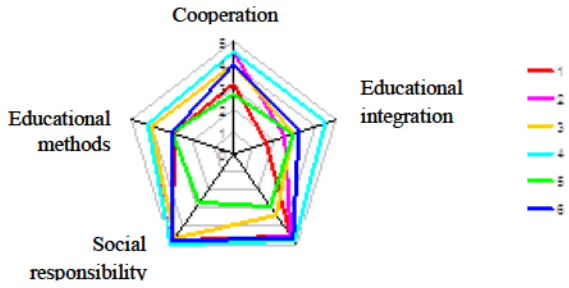
3. Table. Clusters of ICT-metria by the ranges

ICT-metria indicators		Clusters					
		1	2	3	4	5	6
ICT access at school	range	medium	medium	medium	medium	medium	medium
ICT access at home	range	low	medium	medium	high	high	high
ICT use digital competency	range	medium	high	high	high	high	high
attitude towards using ICT	range	medium	medium	medium	medium	medium	medium
ICT usage activity	range	low	low	high	medium	high	low

3. *Correlation dimension*

Thinking along the lines of the models shows a negligible correlation with the characteristics concerning the application of ICT tools, that is, the SEN model does not specify the characteristics of ICT use to a considerable extent or the noted characteristics of the conceptualisation of disability.
The SEN teachers' approach to the application of ICT tools in special needs settings and the methodological dimensions of their education activities show weak but significant levels of correlation, which indicates that the richer the methodological repertoire teachers have, the more open they are to the use of ICT tools in their work and likewise the more positive attitude they have towards the use of this technology in their school work, the more methodological diversity they may draw upon. However, it should be noted that the relation between differentiations is only a trend and our sample does not indicate a correlation between the use of ICT in special needs education and educational management.
In our sample differentiation is an educational method applied independently from the professional methodological variety of the practice of SEN teachers and from its conception.

3. Figure. Clusters of thinking of disability

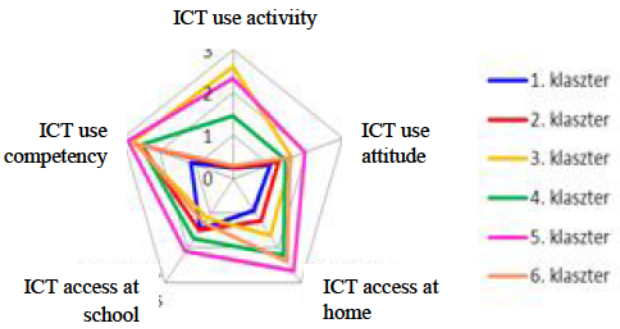


Our sample could be well typified based on the approach to disability and ICT-metria. The difference analysis of the types defined by the six-six clusters paints a detailed picture of the individual areas of research.

The barely significant difference between the cluster types for ICT tools and the *Conceptualising disability clusters* suggests that the individual member's approach to disability has no determining influence on their use of ICT.
However, it is evident that those displaying a more or less social-based approach to disability are more supportive and tolerant in their attitude towards ICT tools and towards the application of these in SEN activities.
With regard to attitudes towards ICT *in the ICT-metria clusters,* comparing the difference between results for the use of ICT tools in SEN activities and the teachers' concepts of disability, *the types with the lowest and highest metria values differ significantly from the other types:*

- *in attitudes towards ICT (less, or much more supportive)*
- *in attitudes towards the application of ICT tools in SEN activities (less, or much more supportive)*
- *the type with lower metria indicators shows less support for integrated education.*

4. Figure. Clusters of ICT-metria



Outlook: the next step and the possibilities of practical use

Directions for possible further research

A number of strands have appeared in our work, which can have significance partly in the continuation of our research, and partly in a more detailed, deeper investigation of the topic. The dichotomy of the models could provide an additional dimension of research requiring a detailed and multi-criteria approach. New results may appear in international literature that may help define more precisely the direction of domestic investigations, but especially in the design of a research tool enabling adequate qualitative and quantitative analyses. In addition, consideration should be given to questions regarding the concept of disability to non-SEN teachers and/or SEN teacher-candidates as test persons (as in international literature, for example, Federici et al. 2008 and McKenzie 2012). Relevant data would be provided for the scientific community on the approach to disability of prospective SEN teachers and mainstream teachers, who may well be working side by side in the future.

The possibilities for practical application

With regard to practice some aspects could be adopted, which in the future may play a role in the dynamic and up to date development of special needs education.
Views on disability have become a highly sensitive area in shaping the minds and attitudes of students entering SEN teacher-training, while also shaping the attitudes of SEN teachers further on in their careers. Becoming acquainted with these views is the first, fundamental step in planning the initial and further training of these persons. Developing and extending the instrument used in the implementation of our research can lead to the design of a test instrument that can be used as a basis for understanding the conscious shaping of views, which can make formal training controllable, traceable and promotable. The typifying displayed in our research can facilitate the design of further professional development training

The *(special needs) educational application of ICT tools* and their integration into activities is a complex process. The literature mentions several background factors in mainstream education as well, on the basis of which Török (2008) developed the ICT-metria also used in our research. This device - if necessary in an adapted form - can be made use of as a form of support for institutions (also) providing special needs education for the development of institutional and human development trends. However, the tool can also provide individual assessments, and makes the development of the individual along each of the indicators measurable.

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